

FIG.2A

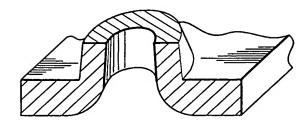


FIG.2B

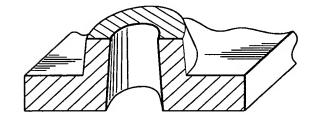


FIG.2C

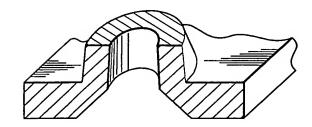


FIG.3A

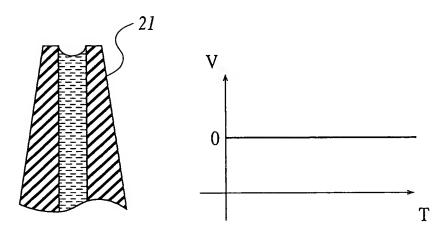
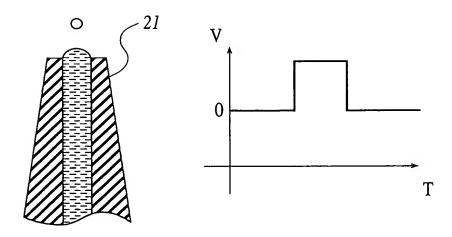


FIG.3B



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FIG.4

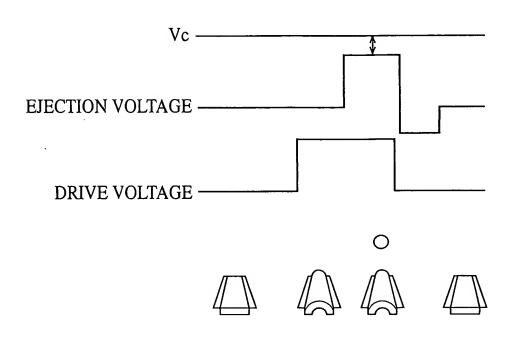
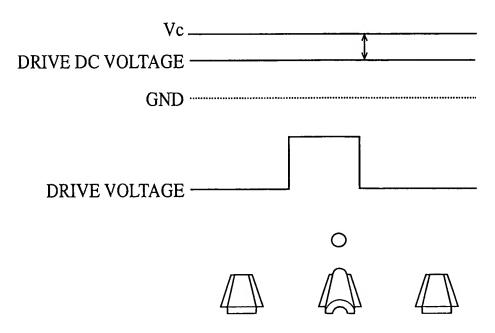


FIG.5



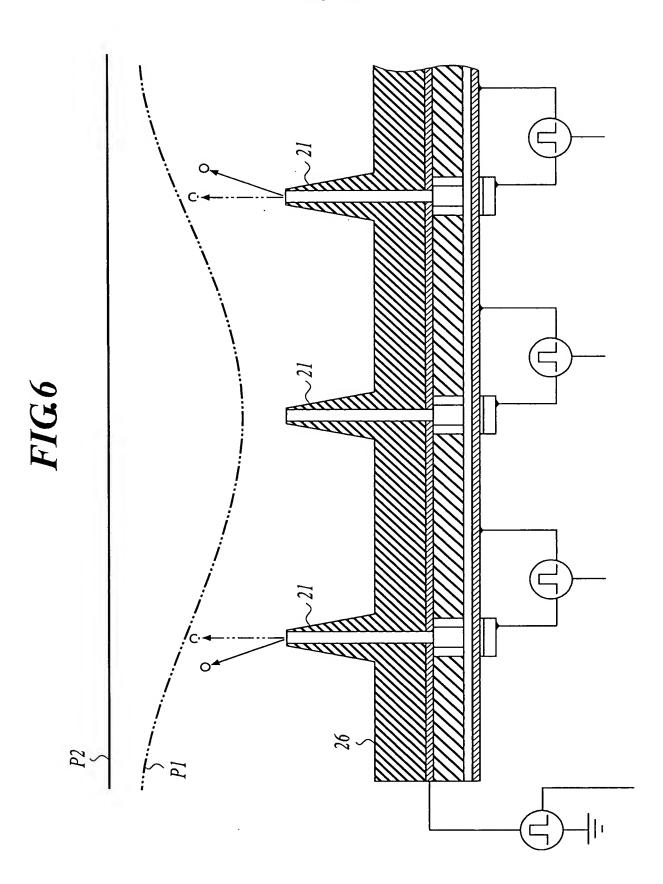


FIG.7

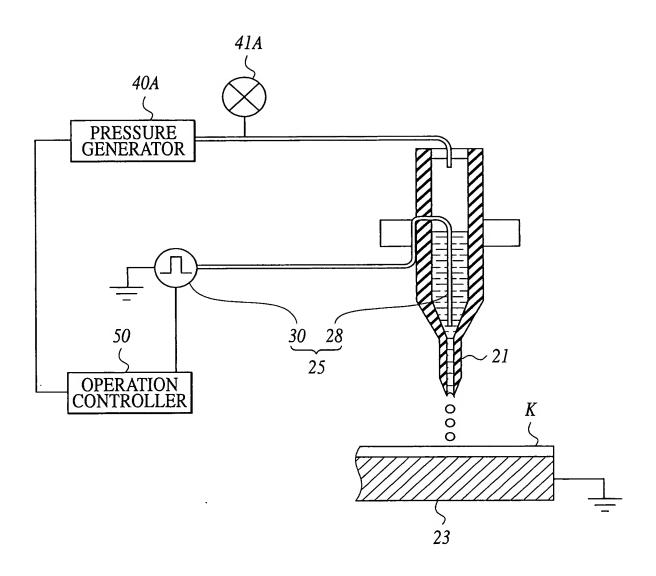
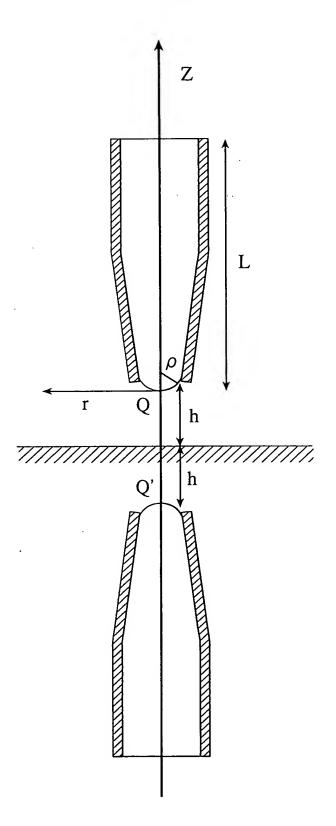


FIG.8



EJECTION START VOLTAGE/RAYLEIGH LIMIT VOLTAGE

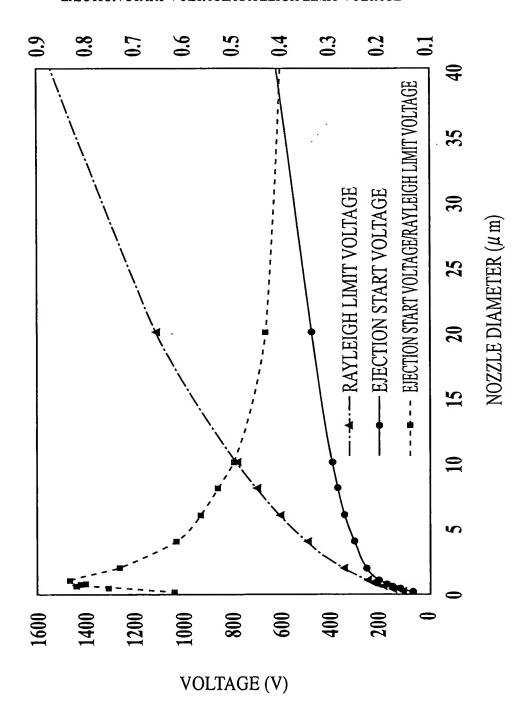
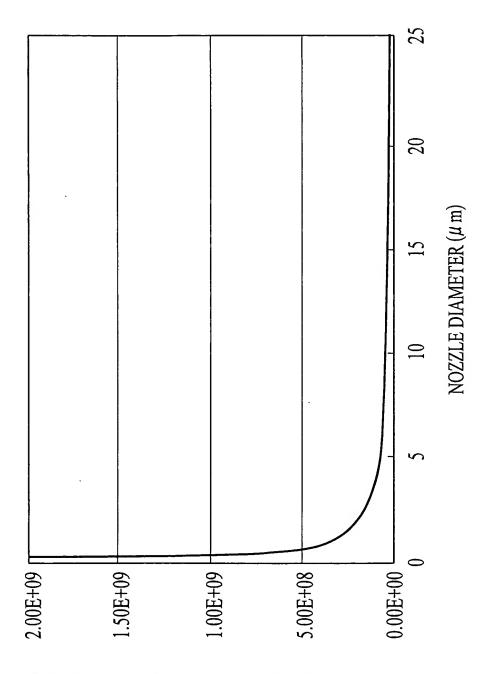


FIG9

FIG10

(μm)GAP 100 (μm)GAP 2000 (μm)(%)0.2 2.001×10^9 2.00005×10^9 0.05 0.4 1.001×10^9 1.00005×10^9 0.09 1 0.401002×10^9 0.40005×10^9 0.24 4 0.1010903×10^9 0.100112×10^9 0.97 10 0.0510196×10^9 0.05005×10^9 1.94 15 0.0277099×10^9 0.0267170×10^9 3.72 20 0.0210476×10^9 0.0200501×10^9 4.98 50 0.00911111×10^9 0.00805×10^9 13.18	NOZZLĘ DIĄMETER	MAXIMUM ELECTRIC FIELD INTENSITY(V/m)	IELD INTENSITY(V/m)	DEVIATION RATE
.2 2.001×10^9 2.00005×10^9 .4 1.001×10^9 1.00005×10^9 0.401002×10^9 0.40005×10^9 0.10110903×10^9 0.100112×10^9 0.0510196×10^9 0.05005×10^9 0.0410563×10^9 0.0400661×10^9 0.0277099×10^9 0.0267170×10^9 0.0210476×10^9 0.0200501×10^9 0.00911111×10^9 0.00805×10^9	(m m)	GAP 100 (µm)	GAP 2000 (µm)	(%)
.4 1.001×10^9 1.00005×10^9 0.401002 × 10^9 0.40005×10^9 0.1010903 × 10^9 0.100112×10^9 0.0510196 × 10^9 0.05005×10^9 0.0410563 × 10^9 0.0400661×10^9 0.0277099 × 10^9 0.0267170×10^9 0.0210476 × 10^9 0.0200501×10^9 0.00911111 × 10^9 0.00805×10^9	0.2	2.001×10^9	2.00005×10^9	0.05
0.401002×10^9 0.40005×10^9 0.1010903×10^9 0.100112×10^9 0.0510196×10^9 0.05005×10^9 0.0410563×10^9 0.0400661×10^9 0.0277099×10^9 0.0267170×10^9 0.0210476×10^9 0.0200501×10^9 0.00911111×10^9 0.00805×10^9	0.4	1.001×10^9	1.00005×10^9	0.09
$0.1010903 \times 10^{9} \qquad 0.100112 \times 10^{9}$ $0.0510196 \times 10^{9} \qquad 0.05005 \times 10^{9}$ $0.0410563 \times 10^{9} \qquad 0.0400661 \times 10^{9}$ $0.0277099 \times 10^{9} \qquad 0.0267170 \times 10^{9}$ $0.0210476 \times 10^{9} \qquad 0.0200501 \times 10^{9}$ $0.00911111 \times 10^{9} \qquad 0.00805 \times 10^{9}$	1	0.401002×10^9	0.40005×10^9	0.24
$0.0510196 \times 10^{9} \qquad 0.05005 \times 10^{9}$ $0.0410563 \times 10^{9} \qquad 0.0400661 \times 10^{9}$ $0.0277099 \times 10^{9} \qquad 0.0267170 \times 10^{9}$ $0.0210476 \times 10^{9} \qquad 0.0200501 \times 10^{9}$ $0.00911111 \times 10^{9} \qquad 0.00805 \times 10^{9}$	4	0.1010903×10^9	0.100112×10^9	0.97
0.0410563×10^9 0.0400661×10^9 0.0277099×10^9 0.0267170×10^9 0.0210476×10^9 0.0200501×10^9 0.00911111×10^9 0.00805×10^9	8	0.0510196×10^9	0.05005×10^9	1.94
0.0277099×10^9 0.0267170×10^9 0.0210476×10^9 0.0200501×10^9 0.00911111×10^9 0.00805×10^9	10	0.0410563×10^9	0.0400661×10^9	2.47
0.0210476×10^9 0.0200501×10^9 0.00911111×10^9 0.00805×10^9 1	15	0.0277099×10^9	0.0267170×10^9	3.72
0.00911111×10^{9} 0.00805×10^{9}	20	0.0210476×10^9	0.0200501×10^9	4.98
	20	$0.009\ 11111\ \times\ 10^9$	0.00805×10^9	13.18





MAXIMUM ELECTRIC FIELD INTENSITY(V/m)

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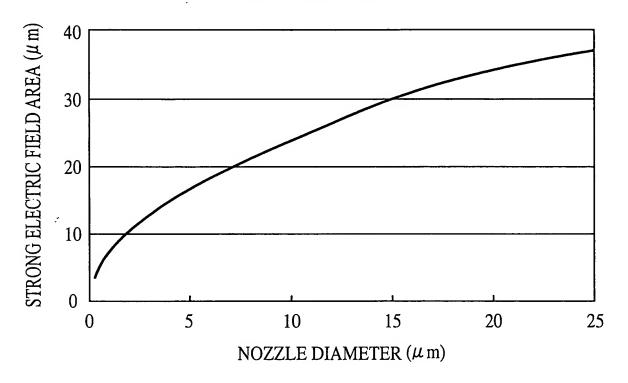
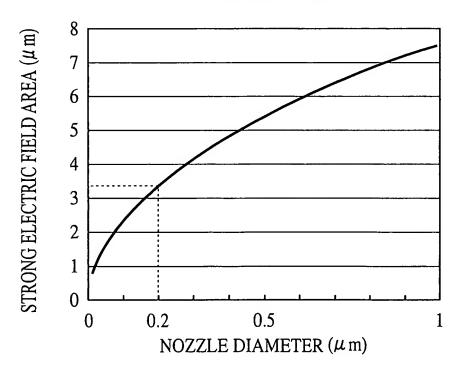
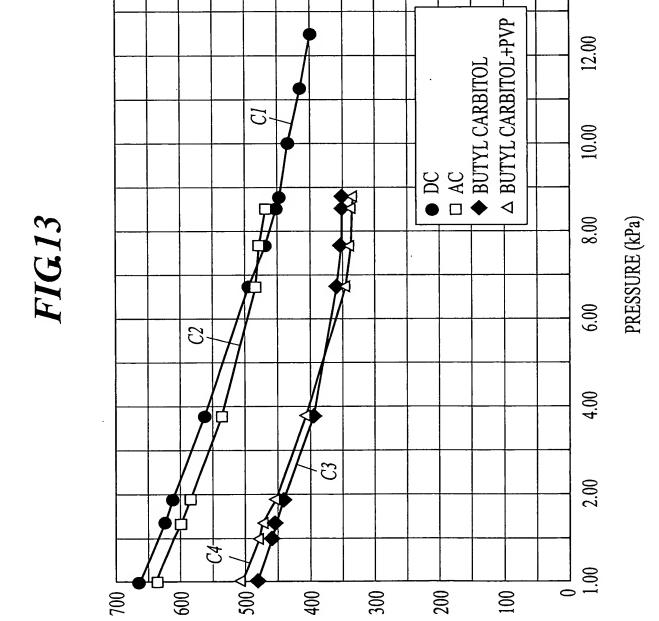


FIG.12B





MINIMUM EJECTION VOLTAGE Vc (V)

FIG.14A

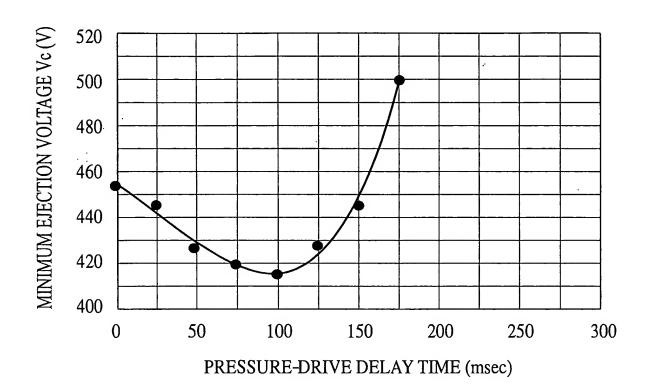


FIG.14B

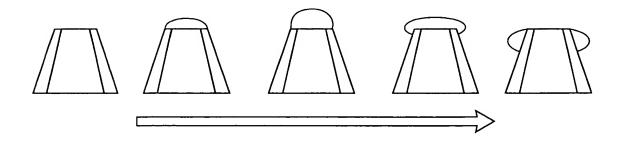


FIG.15

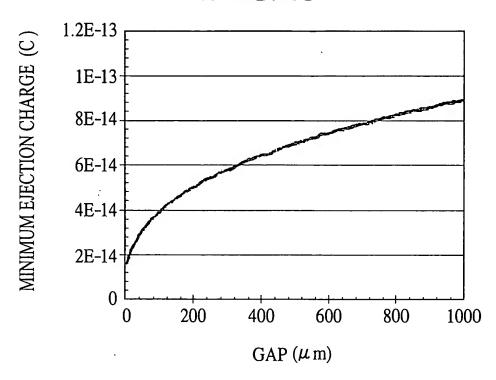
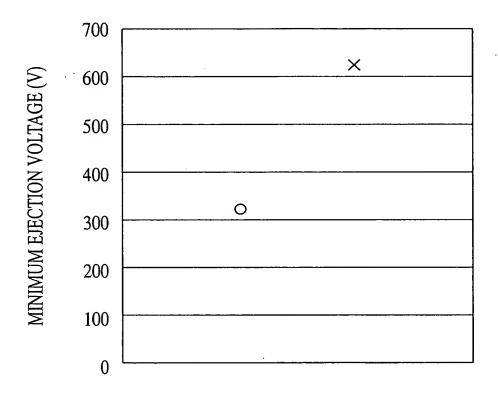


FIG.16

NO77LE	M	ENISCUS CONTR	OL
NOZZLE- SUBSTRATE GAP	NOT APPLIED	APPLIED	
UAF		PRIOR ART (DC DRIVE)	PRESENT INVENTION (PULSE DRIVE)
50 (μ m)	0	0	©
100 (μ m)	X:ATOMIZATION	0	0
1000 (μ m)	X:ATOMIZATION	0	0

FIG.17



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FIG.18

NOZZLE DIAMETER	DC BIAS VOLTAGE APPLIED	PULSE VOLTAGE APPLIED
30 (μ m)	NO OOZING	NO OOZING
10 (μ m)	OOZING	NO OOZING
1 (µ m)	OOZING	NO OOZING

FIG.19

NOZZLE DIAMETER	DC BIAS VOLTAGE APPLIED	PULSE VOLTAGE APPLIED
30 (μ m)	NO CLOGGING	NO CLOGGING
10 (μ m)	CLOGGING	NO CLOGGING
1 (μ m)	CLOGGING	NO CLOGGING